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# Fact Sheet

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## PROCESS ENERGY AND POLLUTION REDUCTION (PEPR)

### The Problem

Most of the Army's energetic production technologies are based on techniques developed 20 to 50 years ago. These processes were designed prior to three major constraints in today's society: energy, environment and lower operating budgets. Although relatively insignificant in the past, today the first two factors can drive the cost up unacceptably, and even close down an operation. Effluent limitations are becoming more stringent at both the state and federal levels. Older processes were not designed to meet these unanticipated changes. Due to competition, commercial industries have adapted to the new requirements, but federal government facilities have been slow to adapt for a number of reasons.

Passage of the Federal Facilities Compliance Act has provided new impetus for process improvement and pollution control. To meet the challenge, the Department of Defense (DOD) has set goals for both reductions in energy use and pollution generation. Executive Order 12759 directs all Federal agencies to improve the energy efficiency of their buildings and industrial facilities by 20 percent from 1985 to 2000. That figure was further increased to 30 percent by 2005 and water conservation measures were added. Additional legislation requires the Army to: reduce the use of energy and related environmental impacts by promoting renewable energy technologies; have a 50 percent reduction in toxic chemical and pollutant releases to the environment by 2000; incorporate waste prevention and recycling in everyday operations; acquire and use "environmentally preferable" products and services to the maximum extent possible; and to periodically modify procurement guidelines to incorporate the latest EPA guidance. The Army's goal for reduction in waste disposal is 50% less by 1999, based on 1994 generation levels.

These goals cannot be met by focusing solely on energy generation methodology or waste treatment techniques. An overall understanding of material demand and waste generation, without altering the basic production process, is required to meet these goals. Too often, processes have been designed to meet theoretical maximums in demand due to the relatively low cost of meeting that demand in the past. The increased cost of these demands warrants a closer look at requirements. Emerging technologies in process monitoring, feedback control and contaminant treatment can meet these goals, maintain mission readiness, and in some cases, even improve process efficiency and/or save money.

### The Technology

The U.S. Army Construction Engineering Research Laboratory (CERL) has developed several useful tools for process and environmental data collection as well as conducting comprehensive facility and process energy/emission analyses. The goal is to improve energy efficiency, production, reliability, and safety, while reducing pollution and other environmental impacts.

A holistic view of the production process from material and energy-in to product and waste-out has been developed and incorporated in a computer based analytical tool called Process Energy and

Pollution Reduction (PEPR). Data is gathered from operating personnel, energy generators and suppliers, and waste disposal operations. Actual energy consumption and pollutant generation throughout the processes are monitored by advanced instrumentation to verify the data. This tool can also be used in conjunction with pollution prevention efforts to predict energy consumption changes as well as new pollutant generation. These data are coupled with emerging technologies in energy delivery and contaminant treatment to optimize the process. This process goes beyond changing a technology to avoid the generation of a specific contaminant that is regulated today. It considers both the new known and/or potential byproducts as well as the energy demands imposed. It also is adaptable to site-specific conditions. Energy costs vary greatly across the U.S., and some environments are more sensitive than others (e.g., air pollution requirements in southern California). All of these factors are considered in optimizing a process.

The PEPR software tool will help DOD industrial facility managers make informed decisions about whether to modify processes or adopt new technology. In addition, guidance on renovation and replacement technologies as well as an expert system will be developed to help installations prepare a prioritized implementation plan to meet required energy and environmental goals.

**Benefits/Savings**

Reduction in energy use translates directly into cost savings. Preliminary estimates based on process reviews conducted at representative Army, Navy and Air Force industrial sites showed that potentially $50 million could be saved annually with a one-time $48 million investment for all DOD process-oriented bases. It is to be noted that only seven processes were examined during the review and many potential process changes to effect energy savings have not been quantified and included in the savings estimate. Experience obtained from private industrial process energy auditing suggests that by aggressively pursuing the PEPR technique, as much as a 70 percent process energy reduction is possible. The collateral economic benefits, including reduced pollution, less waste and improved product quality, often surpass the energy savings.

**Status**

CERL visited large energy-consuming Army industrial facilities, such as Aberdeen Proving Ground, MD; Rock Island Arsenal, IL; Watervliet Arsenal, NY; and Holston Army Ammunition Plant, TN, to obtain information on industrial operations. The Army Environmental Center also provided air emission data for many active Army production facilities. A PEPR workshop and a Level I and II energy/emission review were conducted and documented at Pine Bluff Arsenal, AR. The energy and pollution reduction opportunities at Army, Navy, and Air Force sites were presented at the Industrial Energy Technology Conference. Additional energy conservation and pollution prevention measures are being incorporated into the PEPR software to facilitate technology transfer. Joint efforts with the Army's Industrial Operations Command and the Navy's Best Manufacturing Practices program are being pursued. A process optimization guide for DOD manufacturing and maintenance facilities has been developed and is being used for process audits conducted at Naval Aviation depot (NADEP) in San Diego, CA and Watervliet Arsenal, NY. Incorporation of additional process improvement technologies and expert systems to the PEPR program is underway.

**Point of Contact**

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